

Federal Communications Commission FCC 12-148

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)
Amendment of the Commission's Rules with) GN Docket No. 12-354
Regard to Commercial Operations in the 3550-)
3650 MHz Band

NOTICE OF PROPOSED RULEMAKING AND ORDER

Adopted: December 12, 2012 Released: December 12, 2012

Comment Date: February 20, 2013

Reply Date: March 22, 2013

Comments by Great River Energy

Great River Energy (GRE) supports the Commission's proposal to create a Citizen's Broadband Service in the 3550 – 3650 MHz band including spectrum sharing. GRE also supports combining the 3550 – 3650 MHz band with the neighboring 3650 – 3700 MHz band which is already used for commercial broadband services and is used by some utilities. Additionally, GRE supports the multi-tiered shared access model and the management of the Citizens Broadband Service be managed by a spectrum access system (SAS).

Some of utilities critical communications needs could be served by this band and GRE appreciates the Commission's foresight into potentially creating a Priority Access tier for critical, quality-of-use users. Utilities have more and more communications requirements being placed on them as more smart grid type services such as distribution automation (DA) and Advanced Metering Infrastructure (AMI) are deployed more extensively. In rural areas, in particular, utilities are highly reliant on wireless telecommunications networks to serve these new

requirements in addition to continuing to serve existing telecommunications needs such as Supervisory Control and Data Acquisition (SCADA) on the bulk transmission system, Demand Side Management, and Land Mobile Radio.

Great River Energy Background

Great River Energy is a not-for-profit generation and transmission electric cooperative owned by its 28 member distribution cooperatives. Those 28 member cooperatives in turn provide electrical service to approximately 1.7 million people in a 56,000-square-mile area from Minneapolis-St. Paul suburbs to very rural areas of the north shore of Lake Superior to the farmlands of southwestern Minnesota. The loads served by the member system are primarily residential, seasonal and agricultural loads. GRE owns and operates 12 power plants which generate more than 3,500 megawatts (MW) of electricity. GRE's generation capability is a diverse mix of baseload and peaking power plants, including coal, refuse-derived fuel, natural gas and fuel oil, as well as wind generation.

GRE owns and operates nearly 4,600 miles of transmission lines and owns or partly owns 109 transmission substations. Additionally, GRE interfaces with 28 distribution cooperatives at over 500 distribution substations and has over 150 downline motor-operated switches to which it communicates. All substations and motor operated switches require telecommunications for Supervisory Control and Data Acquisition (SCADA). Additionally, the 28 member distribution cooperatives require telecommunications for Distribution Automation of downline switches, regulators, reclosers, and motor operated capacitor banks. They also use telecommunications for Advanced Metering Infrastructure (AMI) and Automated Meter Reading (AMR).

In addition to SCADA communications, GRE owns and operates a trunked land mobile radio system that is used for voice communications for GRE and 14 of its member distribution

cooperatives. GRE also has a very extensive Load Management/Demand Response system that controls air conditioners, water heaters, electric heat storage and irrigation systems during peak electrical usage. This system has the capability of shaving over 380 MW of load from the system. GRE uses synchrophasors for wide area situational awareness. These synchrophasors require very low latency, highly reliable telecommunications.

Specific Comments

7. We propose to structure the Citizens Broadband Service according to a multi-tiered shared access model that reflects the PCAST recommendation. We propose that the Citizens Broadband Service be managed by a spectrum access system (SAS) incorporating a dynamic database and, potentially, other interference mitigation techniques. The SAS would ensure that Citizens Broadband Service users operate only in areas where they would not cause harmful interference to incumbent users and could also help manage interference protection among different tiers of Citizens Broadband Service users. The three tiers of service would be: (1) Incumbent Access; (2) Priority Access; and (3) General Authorized Access (GAA). We seek comment on this approach. In addition, consistent with the Fast Track Report, we propose to protect existing federal systems operating in the 3.5 GHz Band and seek comment on appropriate allocation models to accomplish the goals set forth in this *Notice*. Qualcomm, Inc. has proposed a similar multi-tiered framework, which it calls “Authorized Shared Access,” and we also seek comment on this concept.

GRE supports the idea of three tiers of service, which includes a Priority Access Tier, which would be available for use by critical users such as utilities. While some utility applications, such as AMI, can use commercial wireless providers there are other utility applications, which as SCADA, distribution automation, and synchrophasors which do require low-latency, highly reliable networks that are built to be ruggedized and withstand several days of power outages. For this reason, utilities typically build their own private telecommunications networks to meet these needs. GRE also supports protecting existing federal systems that are operating in the 3.5 GHz band.

9. The Priority Access tier would consist of a portion of the 3.5 GHz Band designated for small cell use by certain critical, quality-of-service dependent users at specific, targeted locations. We seek comment on who these eligible users should be and suggest that they could include hospitals, utilities, state and local governments, and/or other users with a distinct need for reliable, prioritized

access to broadband spectrum at specific, localized facilities. We expect that the availability of the Priority Access tier could bring the benefits of mass-market commercial scale to specialized uses and provide a new alternative to dedicated spectrum, which is in short supply. In order to prevent an expectation of quality of service in areas where such an expectation might not be warranted, Priority Access operations would only be permitted in geographic zones with no likelihood of harmful interference from Incumbent Access users and no expectation of harmful interference from Citizens Broadband Service users to Incumbent Access users. Priority Access users would be required to register in the SAS and accorded protection from interference from lower tier users and other Priority Access users within their local facilities.

GRE agrees with the Commission's recommendation that a Priority Access tier be created with eligible critical users including utilities, hospitals, and state and local governments. GRE agrees that Priority Access operations would only be permitted in geographic zones where there is no likelihood of harmful interference from Incumbent Access users and no expectation of harmful interference to Incumbent Access users. GRE also agrees that Priority Access users should be required to register in the SAS and accorded protection from interference from lower tier users and other Priority Access users within their geographic areas.

11. Under our main proposal, users in the Priority Access and GAA tiers would be licensed by rule as Citizens Broadband Service users under Part 95 of the Commission's rules. A license-by-rule approach would provide individuals, organizations, and service providers with "automatic" authorization to deploy small cell systems, in much the same way that our Part 15 unlicensed rules have allowed widespread deployment of Wi-Fi access points. In the present context, we believe licensing by rule provides two advantages compared to unlicensed authorization. First, as a licensed service, 3.5 GHz Band operations would enjoy greater interference protection status in the Table of Frequency Allocations consistent with the proposed multi-tiered approach. Second, licensing by rule might allow for a more unified authorization framework for multiple tiers of users that otherwise might fall into different parts of the Commission's rules. We seek comment on whether the proposed framework could be implemented through other regulatory approaches, including through the Part 15 unlicensed rules or through geographic area licensing. We also seek comment on the benefits that could accrue to federal users through use of the Citizens Broadband Service.

GRE agrees with Commission in that a license-by-rule approach would be preferred above unlicensed operation in the Priority Access and GAA tiers. If utilities are to make use of the 3.5 GHz band for mission critical communications, protection from interference is of paramount importance. Utilities may

use this spectrum for remotely switching lines and other power grid electrical equipment where the safety of line workers is at risk if interference occurs. Most utilities do not use unlicensed spectrum for critical control systems.

12. We also offer a supplemental proposal to integrate the 3650-3700 MHz band within the proposed Citizens Broadband Service, thereby encompassing an additional 50 megahertz of contiguous spectrum. The Commission currently licenses the 3650-3700 MHz band on a non-exclusive basis, with protections for incumbent FSS operations. The 3650-3700 MHz band is used extensively by wireless Internet service providers (WISPs), among others, to provide commercial broadband service. Expanding the Citizens Broadband Service to include this band could bring benefits of greater spectrum availability and equipment scale economies to current 3650-3700 MHz licensees. Under our proposal, the SAS would authorize existing licensees as GAA users in the larger, combined band, and would authorize higher power levels in less congested areas, provided there is no risk of harmful interference to Incumbent Access or Priority Access operations. This proposal contemplates conversion of the existing non-exclusive licensing framework to the license-by-rule framework proposed herein. We also note that the 3650-3700 MHz band is currently allocated on a primary basis to the federal radiolocation service in three locations. We seek comment on the potential impact of these proposed changes in the use of the 3650-3700 MHz band on these and other incumbent operations.

GRE supports integrating the 3650 – 3700 MHz band with the proposed Citizens Broadband Service.

Utilities have made use of the 3650 – 3700 MHz band for operation of the power grid and by integrating the two bands, it allows for more flexible and efficient use of spectrum for critical infrastructure such as utilities and provides for more capabilities and more bandwidth for applications. GRE, as a mostly rural utility, supports the Commission's proposal of authorizing higher power levels in less congested areas.

As previously mentioned, utilities rely heavily on wireless communications networks in rural areas where it is expensive to build fiber to electrical substations and other electrical devices which require communications.

AMI networks in rural areas would also benefit from higher power levels. Fewer collection points from meters would be required making more affordable metering and Demand Side Management of systems in rural areas. Deployment of advanced metering capabilities in rural areas has been hindered in the past due to the few number of meters per mile in an area making wireless advanced two way metering systems too costly to deploy. By allowing higher power levels, fewer transmitters are required making a telecommunications network at these higher frequencies more affordable. Additionally, some of GRE's

member distribution cooperatives provide wireless Internet service to its members in rural areas, and by allowing higher power levels for GAA users as well, deployment of wireless Internet Service also becomes more affordable.

13. If implemented, the new Citizens Broadband Service could help address the ongoing capacity shortage and promote new innovations in broadband technology, deployment, and spectrum management while protecting incumbent authorized federal and grandfathered FSS users. In order to develop a comprehensive record on this proposal, we seek comment on a wide range of technical, licensing, and other related issues. To that end, we seek comment on: (1) appropriate licensing schemes; (2) specific flexible and resilient interference mitigation technologies and techniques that could be implemented by Citizens Broadband Service users; (3) appropriate deployment strategies for Citizens Broadband Service devices; and (4) the SAS dynamic database that is envisioned to manage access to and use of the 3.5 GHz Band. To ensure the development of a comprehensive record, we may release additional notices, analyses, or white papers for comment during the course of this proceeding. Moreover, because this proceeding raises significant novel technical issues with respect to sharing with federal users, we expect to work closely with NTIA and relevant federal agencies to perform necessary further analysis, and we encourage commenters to provide relevant technical input to inform this analysis, where appropriate.

GRE agrees with the Commission's proposed course of action for a three tiered licensing scheme and using a SAS dynamic database. The 3.65 GHz band's lightly licensed approach has had its challenges. Not all users register in the database and some users have registered in the database, but are no longer using that service making the database inaccurate and ineffective. GRE supports using cognitive radios and other technical means to reduce interference with neighboring users of the band.

61. We propose to establish the Citizen's Broadband Service by rule under Section 307(e) of the Communications Act. We believe that a license-by-rule licensing framework would allow for rapid deployment of small cells by a wide range of users, including consumers, enterprises, and service providers, at low cost and with minimal barriers to entry. Much wireless broadband use occurs indoors or in other enclosed facilities. Typically, the owners or users of such facilities already have access to the siting permissions, backhaul facilities, electrical power, and other key non-spectrum inputs for the provision of service. Moreover, as explained above, our proposal for small cell operation at the relatively high frequency 3.5 GHz Band would generally tend to contain service within such facilities, allowing for a very high degree of spectrum reuse. Therefore, authorizing these end users—or their agents or assignees—to have direct access to the 3.5 GHz Band in the physical locations that they otherwise are able to access would seem to facilitate expeditious and low-cost provision of service. A license-by-rule framework is very compatible with and conducive toward these aims.

While GRE agrees, that much wireless broadband use occurs indoors, electric utilities have very little use for telecommunications within buildings. The majority of GRE's telecommunications challenges are telecommunications to substations and downline intelligent electrical devices (IEDs) that are monitored and controlled remotely. Additionally, GRE's member cooperatives have these same challenges, but also have challenges with deploying AMI systems to their residential, commercial, and industrial customers.

GRE has distribution cooperative members that provide wireless internet service to their customers using unlicensed 2.4 GHz spectrum. GRE views the GAA tier access as another spectrum band that could be used in rural areas by electrical cooperatives, rural telcos, or others for providing or expanding rural broadband Internet service. For this reason, GRE encourages the Commission not to think only of 3.5 GHz to be used as small cell deployments, but to allow for flexibility in the band.

68. NTIA's analysis only considered WiMAX technology for shared use of the 3.5 GHz Band. As detailed below, the small cell and access management technologies proposed in this *Notice* alter some of the assumptions in this analysis. We expect new analyses reflecting the changed assumptions set forth in this *Notice* to be an integral part of the record in this proceeding. As detailed below, we seek comment on these altered assumptions and their possible impact on interference to and from federal systems in the 3.5 GHz Band.

GRE encourages the Commission to not restrict operation in this band to one technology. While WiMAX may make the most sense for Internet service, it may or may not make the most sense for other telecommunications networks that utilities, hospitals, or other that may want to make use of the band as a Priority Access tier user. Multiple technologies should be able to reside on the same frequency band if licensing and interference mitigation techniques are employed properly.

71. We seek comment on whether Priority Access operations should be allowed in the 3.5 GHz Band. Commenters should consider the following questions: Should a Priority Access tier be implemented and, if so, is this the appropriate scope? Should critical safety-of-life applications be permitted in this tier? Would Priority Access users be able to achieve a meaningful level of service given the restrictions we have proposed? Would Incumbent Access tier users be sufficiently protected from harmful interference? How would the SAS dynamically manage interaction between the Priority Access tier and other tiers? Should Priority Access devices be explicitly limited to indoor operations or would higher power levels and expanded, outdoor operations be appropriate? Commenters are encouraged to provide detailed comments and proposals, including alternatives to the proposals in this *Notice* and to fully address implementation details of the dynamic database as well as the technical licensing and regulatory ramifications of the proposal in this *Notice* with respect to Priority Access users.

GRE supports the creation of a Priority Access tier in the 3.5 GHz band. Utilities spectrum allocation is been limited to the Industrial Business spectrum pool and as such utilities have been forced to compete for spectrum with construction companies, bus companies, and pizza delivery companies. Utilities have not had access to broadband spectrum unless it is unlicensed spectrum or purchased or leased in auctions which have in the past been unaffordable for most electric utilities. Utilities own, operate, and maintain mission critical telecommunications networks which are required for the safe and reliable operation of the electrical power system. These telecommunications networks are critical for the safety of the public at large. They are used to eliminate electrical system outage or reduce the time of electrical outages when they do occur. In the case of natural or man-made disasters, the fast response time to eliminate the threat to the public caused by down power lines and other electrical system hazards is critical. Access to broadband spectrum for these mission-critical operations is imperative. Additionally, telecommunications requirements for electrical system operations are increasing as smart grid applications are deployed.

72. *General Description.* We propose that eligible users be authorized to operate on a Priority Access basis within a substantial portion of contiguous spectrum (e.g., 50 megahertz) in the 3.5 GHz Band, subject to the technical rules that are ultimately adopted

in this proceeding. Under our proposal, eligible users would be required to register their identity along with the location of their facilities in the SAS. The database would authorize Priority Access use only by eligible users operating within eligible facilities within designated geographic areas. Reservation of frequencies for Priority Access use in a given location would occur only while Priority Access users are actually operating, ensuring that Priority Access spectrum would be available for GAA users when systems are not in use. Through use of the SAS and any other mitigation strategies that are ultimately adopted in this proceeding (including maximum transmitter power levels, limits on in-band and out-of-band emissions, flexible and resilient spectrum sharing technologies, and contention protocols), we anticipate that Priority Access users would be able to deliver a variety of consistent, high quality wireless broadband services to their users. Due to the propagation characteristics of the 3.5 GHz Band and the relatively low power levels we propose, we anticipate that Priority Access users would operate primarily indoors, though it may be possible to extend the construct to outdoor deployments.

As previously mentioned, if utilities are to use the spectrum for mission critical operation of the electrical power system, power levels need to be permitted to be high enough for outdoor deployments. Very little mission critical electric utility telecommunications requirements are required in an indoor environment. In rural areas where there are fewer users in the band, GRE thinks that small cells and larger cells if licensed and managed properly could co-exist.

Additionally, if the GAA tier could be used for providing wireless Internet service in rural areas that are not served or are underserved for internet service, higher power levels would also be required.

73. *Eligibility.* In recent years, many kinds of “mission critical” users have sought dedicated spectrum to provide quality-assured operations. However, dedicated spectrum is in short supply and it is unlikely that enough spectrum will be freed in the near future to meet the escalating needs of these critical users. Setting aside nationwide bands for specific uses—even when shared with other existing users—may preclude access by others that might occur at different locations without a risk of harmful interference. We believe that the high spatial reuse characteristics of low-power 3.5 GHz transmissions, combined with access management facilitated by the SAS, should allow the 3.5 GHz Band to be utilized on a shared, licensed basis by a variety of critical users to provide high quality services to localized facilities. Therefore, we propose to limit eligibility for inclusion in the Priority Access tier to these kinds of critical uses. We seek comment on the viability of this service tier and the ideal scope of the eligible class of users. Commenters should consider whether Priority Access use should be limited to critical use facilities and, if so, who should be considered a critical user. What issues could be raised by including federal entities as

eligible Priority Access users? We also seek comment on methods for validating whether a user qualifies as a critical user. Alternatively, should the Priority Access tier be expanded to include all real property owners in eligible geographic areas, so that the Priority Access protections convey as an “air right” with use of the premises? How would eligible users be registered and verified in the dynamic database? What security measures could be implemented to prevent unauthorized users from obtaining Priority Access use of the 3.5 GHz Band?

GRE appreciates the Commission’s acknowledgement that critical users have not had access to dedicated spectrum. GRE that critical users that should be eligible to use the Priority Access tier of the Citizens Broadband Service should include utilities, public safety, and hospitals.

74. *Band Plan.* We propose to allow Priority Access services across one-half of the 3.5 GHz Band (50 megahertz). We believe that this approach would provide adequate capacity for Priority Access users while ensuring that GAA users may access the remainder of the spectrum at any given location. We seek comment on this approach, including whether dividing the 3.5 GHz Band in this manner would serve the public interest. We seek comment on the specific portion of the band that should be reserved for Priority Access uses. We also seek comment on whether the specific frequencies available for Priority Access use should be set by rule to be consistent on a nationwide basis or should be set dynamically in the SAS on a location-by-location basis. We also seek comment on other band plans. For instance, should the 3.5 GHz Band be divided into channels? If so, how large should the channels be and should they be paired or unpaired? Should all channels be available for all Citizens Broadband Service users in all geographic areas? Or should some form of static or dynamic channel assignment be implemented as part of the SAS? We encourage commenters to explain in detail how any such alternative a band plan would be structured.

GRE supports the Commission’s proposal of allocating one-half of the 3.5 GHz band for Priority Access services and giving the remaining spectrum to GAA users. This provides broadband spectrum for both critical users and entities wishing to build out wireless Internet service to unserved or underserved areas which is very important to the communities in the rural areas which GRE serves.

75. We believe that for the 3.5 GHz Band to be used efficiently, we must authorize opportunistic uses beyond the Priority Access tier described above. Under our proposal, GAA devices could be used for a variety of residential, business, and enterprise purposes to

offset capacity shortages and extend wireless coverage to currently unserved or underserved areas. We propose that such devices be permitted to operate only in GAA and Priority Access Zones, that they be required to register in the SAS, and that they be required to employ mitigation technologies to avoid interference with Priority Access and Incumbent Access tier users, including geo-location capabilities. GAA users, regardless of the geographic zone in which they operate, would not have an expectation of protection from harmful interference. We seek comment on this proposed approach.

GRE agrees with the Commission's position that GAA users, regardless of their geographic zone of operation should not have an expectation of protection from harmful interference.

Interference mitigation, for the most part, should be able to be handled technically by equipment deployed for this service similarly to how many Part 15 devices mitigate interference.

80. Expanding the applicability of our proposed licensing model for the Citizens Broadband Service in this way could have significant benefits for current 3650-3700 MHz operators, new entrants, and the general public. Aside from the obvious benefits inherent in gaining access to an additional 100 megahertz of spectrum, existing operators would benefit from the new device ecosystem that is likely to develop within this space. By combining it with the 3.5 GHz Band, the utility of the band could increase, attracting new operators and encouraging the development of a larger equipment market. Economies of scale could drive down the price of equipment for current 3650-3700 MHz licensees and future Citizens Broadband licensees, making it more affordable for new and existing operators to expand their service offerings. On the other hand, including the 3650-3700 MHz Band in the Citizens Broadband Service could subject current licensees to transition costs and a potentially more complicated regulatory regime. We seek comment on the relative costs and benefits of the supplemental proposals, as compared to retaining the current framework for 3650-3700 MHz band licensees.

GRE defers to comment on the costs and benefits of how to combine the 3650 – 3700 MHz band with the 3550 – 3650 MHz band as GRE currently does not operate in the 3650 – 3700 MHz band. However, GRE wishes to reiterate its support for integrating the two bands.

82. We seek detailed comments on this proposal. In particular, commenters should address whether allocating a contiguous 150 megahertz block of spectrum for shared commercial broadband deployment in this manner is in the public interest. Commenters should also address the costs and benefits to the public and existing 3650-3700 MHz service providers associated with this proposal. How will the transition be managed for existing 3650-3700

MHz operators? What are the costs associated with such a transition? Is there any reason or benefit to treating existing stations using an unrestricted protocol in the 3675-3700 MHz band differently than those using a restricted protocol in the 3650-3700 MHz band? How will existing sharing agreements between current operators be treated? What criteria should determine whether the SAS may authorize higher power levels in a specific location? We also seek comment on the degree to which combining the bands in this manner will improve the device marketplace and drive economies of scale. What effect, if any, will these proposed changes have on existing incumbent operations in the 3650-3700 MHz Band?

Higher power levels could be used in specific locations dependent upon population and geography. There are many rural areas where higher power levels could be used without causing harmful interference to others on the band.

84. *Two-Tier Variation.* We seek comment on whether a two-tiered model composed solely of Incumbent Access and Priority Access tiers, similar in concept to Qualcomm's Authorized Shared Access proposal, would be more appropriate for the 3.5 GHz Band. Under this regulatory model, Incumbent Access users would continue to be protected from harmful interference and the remaining available spectrum would be licensed under criteria similar to those applicable to the proposed Priority Access tier. Similar database and technological coordination techniques described above would apply to this model as well and access would be permitted only within designated geographic areas. However, GAA use would not be permitted under this alternate proposal. We expect that this model would be compatible with the alternative licensing approaches described herein. We seek comment on this two-tier alternative, including the costs and benefits. What impact could this alternative have on spectrum efficiency in the 3.5 GHz Band relative to our three-tiered approach? Under this approach, should Priority Access users be allowed to operate in areas where interference could be expected from Incumbent Access users? Is there a specific licensing approach that is most compatible with this model? How would the use of a two-tiered framework affect the costs and benefits to wireless operators, enterprise users, consumers, or other potential users of the spectrum?

While the two-tiered model variation provides is appealing to GRE as a potential Priority Access user, there should be sufficient bandwidth to allow for a three tiered model. By having a three tiered model and a GAA tier, broadband services to the general publics have the potential to be built out. In rural areas, that is also important as there are few options for internet connectivity.

As previously mentioned, some of GRE's member distribution cooperatives provide that service to their members in the unlicensed 2.4 GHz band.

94. Finally, regarding international coordination, Canada and Mexico utilize the 3.5 GHz Band for FSS operations. We seek comment on the potential for interference to and from existing and future international operations in the 3.5 GHz Band. We also seek comment on methods to reduce or eliminate the potential for interference along international borders.

GRE has a service area that includes the north eastern part of Minnesota and as such borders

Canada and as such it is concerned about interference to and from international operations.

Power levels along international boundaries could be reduced in order to reduce interference to international users. Interference mitigation within the equipment may be possible in order to reduce the effects of interference from international users depending on their location, power level, etc.

102. We therefore propose to incorporate into the SAS the relevant parameters, including the geographic zones of operation discussed herein, necessary to protect DoD operations in the 3.5 GHz Band and grandfathered FSS sites. We propose to require Priority Access tier users to register the coordinates of their locations into the database. Registration could occur manually or through an automated process facilitated by any equipment utilizing the band. We also propose to require GAA users to query the SAS at set intervals prior to and during operation. For instance, GAA devices could query the SAS anytime a device is activated, when a device is moved, or at some set time interval. We seek comment on these proposals.

Manual registration into a database would also require users to unregister when they are no longer using a site or system. There are many challenges in trying to keep this information up to date and accurate. For this reason, GRE supports automatic database registration and also deregistration.

Summary

GRE support's the Commission's proposal of creating a Citizen's Broadband Service which allows a Priority Access tier that critical users, including electric utilities would be eligible to use. The Commission should combine the 3550 – 3650 MHz band with the 3650 – 3700 MHz band. The Commission should also increase power levels in rural areas to allow for outdoor larger cell deployments. The Commission should require users to register in an SAS database to mitigate interference and should develop technical rules and requirements for equipment to mitigate interference.

Respectfully Submitted,

Great River Energy